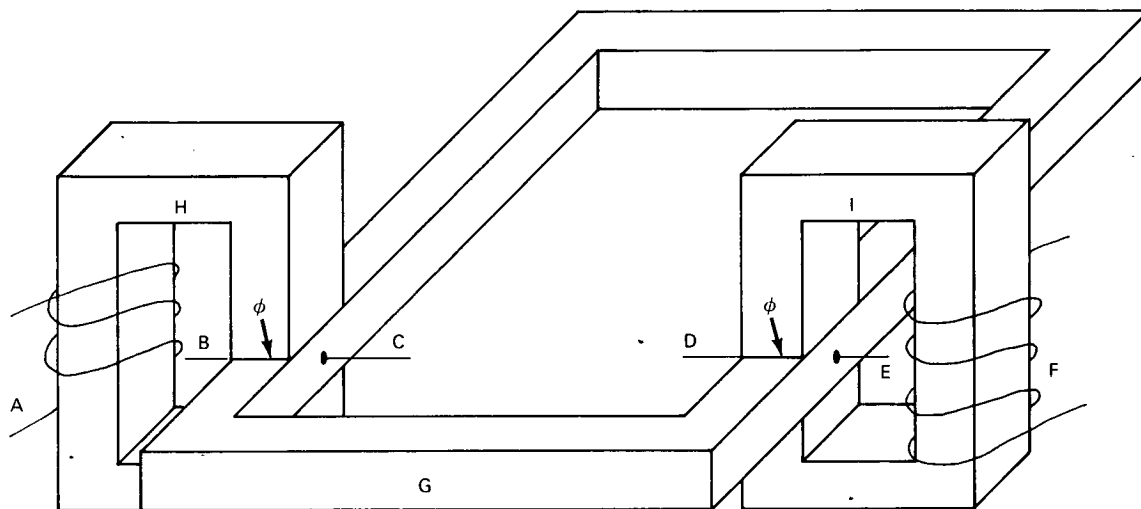


# NASA TECH BRIEF



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## Concept to Convert Electrical Power



An idea has been conceived, based on published studies of the performances of liquid metals in the presence of field fluxes and the physics of electricity and magnetism, that could produce advantageous electrical power conversion techniques. By this concept, it may be possible to transform electrical energy, either alternating current or direct current from one voltage level to a different voltage level, or from ac to dc or vice versa.

The concept envisions a moving fluid electrical conductor as its only physically moving part, in contrast to the brushes, commutators, slip rings, and the like found in conventional conversion devices. The electrically conductive fluid of this concept is to perform as a coupling medium between or among multiple electromagnetic fields to transfer energy between or among the fields, and, in accordance with their designs, produce the desired conversions.

Exciting coil A of the electromagnet consisting of it and the magnetic core H will cause a magnetic field

to exist between its poles, between which is placed a hollow closed channel or pipe G containing an electrically conductive fluid, with the longitudinal axis of one leg of the channel at right angles to the axis of the magnetic field. A voltage impressed between electrodes B and C in the walls of the channel and in contact with the fluid, in the locations shown, will cause a current to flow through the fluid in a direction at right angles to the axis of the magnetic field. A force will then be applied to the fluid within the fields and in a direction perpendicular to both of them, or in the direction of the leg of the channel. This force will cause the fluid to circulate around the closed loop of the channel in a continuous flow, as long as the magnetic field and the current flow between electrodes B and C are maintained.

Fluid passing between the poles of a second electromagnet consisting of core I and coil F, positioned as shown so that the fluid flow is perpendicular to its magnetic axis, will, when coil F is energized, induce a

(continued overleaf)

voltage between electrodes D and E.

Adjustment of the magnetic field in magnet H and the current between electrodes B and C will determine the rate of fluid flow, and, for a given fluid flow, adjustment of the magnetic field in magnet I, will determine the voltage induced between electrodes D and E.

Through these adjustments, the output voltage appearing at electrodes D-E may be any desired value regardless of the input voltage impressed at electrodes B-C. Also, through proper control of the magnets, the input circuit may be alternating current while the output circuit is direct current, or vice-versa, and if direct currents only are desired in either circuit, the

magnet in that circuit may be replaced with a permanent magnet.

**Note:**

This development is in conceptual stage only, and, as of date of publication of this Tech Brief, neither a model nor prototype has been constructed.

**Patent status:**

No patent action is contemplated by NASA.

Source: N. Ratti  
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under contract to  
Goddard Space Flight Center  
(GSC-10222)